Seroprevalence of *Toxoplasma gondii* Among Pregnant Sudanese Ladies

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**Abstract**

**Introduction:** The present study aimed to find the seroprevalence of toxoplasmosis and assess its associated risk factors among pregnant women.

**Methods:** This retrospective hospital-based study was carried out in the period between January 2009 and December 2010 in Eldammar, River Nile State, Sudan. Chi-square was used for trend analysis, and *P* value was used to declare the statistical significance between the variables.

**Results:** A total of 383 pregnant women (age range: 16–45 years) visiting Eldammar teaching hospital and other health centers for antenatal care were selected. Using latex agglutination test (LAT), 74.7% (285/383) were positive for toxoplasmosis. ELISA (enzyme-linked immunosorbent assay) was used for IgM & IgG confirmatory, and the results showed that 26% (74/285) and 34.7% (99/285) were positive for toxoplasmosis. There was a significant correlation between serological evidence of toxoplasmosis and low education level, eating undercooked meat, and drinking raw milk (*P*<0.05).

**Conclusion:** There was a high prevalence of toxoplasmosis among pregnant women of the studied population. A positive correlation was reported between toxoplasmosis and low education level, eating undercooked meat, and drinking raw milk.

**Keywords:** Toxoplasmosis, ELISA, Eldammar, Sudan

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**Introduction**

*Toxoplasma gondii* is an obligate intracellular protozoan parasite that contaminates all warm-blooded creatures. *T. gondii* infection is possibly the most well-known human infection. The situation assessed that around 33% of the world population has been exposed to *T. gondii* (1). Humans are affected by eating crude or half-cooked meat contaminated with sporulated oocysts, or by exposure to infested environment (2). Other rare reasons for infection include vertical transmission to the embryo, and via organ transfer from infected donors (3).

Moms who obtained the parasite at a far off time prior to gestation has a restricted danger of inborn disease (4). The seriousness level of inherent toxoplasmosis is conversely identified with gestational age at the hour of contamination. Throughout the primary trimester, the frequency of transmission is low yet the contamination will bring about serious inherent toxoplasmosis. Late disease is described by high transmission, yet less fetal bleakness (5). A wide scope of antagonistic pregnancy results have been portrayed including unconstrained premature delivery or stillbirth. Inherent toxoplasmosis in a newborn child next vertical transmission can prompt a broad scope of bleakness and death (6,7).

Extreme baby blues and myonecrosis can result from *T. gondii* and *Clostridium perfringens* (8). There is a wide uniqueness in the frequency of intrinsic toxoplasmosis in the created nations, ranging from 1 to 10 in 10000 live births (9). Higher rates have been reported in the United Kingdom (3.4/10000) (10) and Denmark (4/10000) (11). Serological testing for *Toxoplasma* antibodies is broadly used (12,13).
In Arab and African nations, information on T. gondii during pregnancy is sparse. Additionally, most investigations are provincial. Pregnant women are not regularly examined for T. gondii during pregnancy, and development does not exist. Thus, the present study aimed to find the seroprevalence of toxoplasmosis and assess its associated risk factors among pregnant women (14).

Materials and Methods

Study Design
This retrospective hospital-based study was carried out in the period between January 2009 and December 2010 in Eldammar (300 kilometers north of Khartoum), River Nile State, Sudan.

Study Population
All pregnant women visiting Eldammar hospital and other health centers during the study period were asked to answer a structured questionnaire consisting of socio-demographic data, as well as risk factors of toxoplasmosis.

Study Variables
The dependent variable of this study was toxoplasmosis test results, because the independent variables were education level, eating undercooked meat, and drinking raw milk.

Sample Size and Data Collection
In this study, 5 mL of blood samples were taken from all subjects. The sera were separated in free anticoagulant plain containers and the serological evidence of toxoplasmosis were tested using latex agglutination test (LAT) SPINREACT. S.A/S.A.U Ctra. Santa Coloma, Spain). Any positive result by LAT confirmed by ELISA (enzyme-linked immunosorbent assay).

Data Analysis
The Statistical Package for Social Sciences version 20 (SPSS Inc., Chicago, IL, USA) was used for data analysis of the demographic characteristics. Laboratory findings of toxoplasmosis test and demographic data were analyzed by simple descriptive statistics. Chi-square test was used to compare every two variables. A P value less than 0.05 was considered as statistically significant.

Results
A total of 383 pregnant women from different localities in Eldammar enrolled in the study. The ages of the participant ranged from 16 to 45 years. 74.4% (285/383) were positive for toxoplasmosis by latex agglutination test, and 26 % (74/285), 34.7 % (99/285) were positive for toxoplasmosis by ELIZA IgM & IgG. (Table 1).

Study showed statistically significant correlation between toxoplasmosis and (low education level, eating undercooked meat, and drinking raw milk with P value (P < 0.05). Table 2 and 3

Discussion
Seroprevalence of toxoplasmosis in the present study was 74.4% by LAT and 26%, 34.7% by ELISA IgM and IgG respectively which is higher than the study implemented in Atbara River Nile State-Sudan (33.6%) by LAT (13), this due to small sample of the compared study or due difference of lifestyle between two study areas, or due to different accuracy of LAT reagent used.

The study revealed there was a statistically significant correlation between toxoplasmosis and low education level (P=0.01, P=0.04), eating undercooked meat (P=0.00,

<table>
<thead>
<tr>
<th>Test</th>
<th>Positive</th>
<th>Negative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAT</td>
<td>285 (74.4%)</td>
<td>98 (25.6%)</td>
<td>383 (100%)</td>
</tr>
<tr>
<td>ELISA IgM</td>
<td>74 (26%)</td>
<td>211 (74%)</td>
<td>285 (100%)</td>
</tr>
<tr>
<td>ELISA IgG</td>
<td>99 (34.7%)</td>
<td>186 (65.3%)</td>
<td>285 (100%)</td>
</tr>
</tbody>
</table>

Table 2. The Correlation between Toxoplasmosis and Education Level, Eating Undercooked Meat, and Drinking Raw Milk

<table>
<thead>
<tr>
<th>Parameter</th>
<th>LAT Screening</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Education level</td>
<td>Primary school and below</td>
</tr>
<tr>
<td></td>
<td>Secondary school and above</td>
</tr>
<tr>
<td>Eating undercooked meat</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Drinking raw milk</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

Table 3. The Correlation between Toxoplasmosis and Education Level, Eating Undercooked Meat, and Drinking Raw Milk

<table>
<thead>
<tr>
<th>Parameter</th>
<th>ELISA IgM</th>
<th>P value</th>
<th>ELISA IgG</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education level</td>
<td>Primary school and below</td>
<td>118</td>
<td>153</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>Secondary school and above</td>
<td>54</td>
<td>58</td>
<td>0.04</td>
</tr>
<tr>
<td>Eating undercooked meat</td>
<td>Yes</td>
<td>58</td>
<td>47</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>114</td>
<td>164</td>
<td>0.04</td>
</tr>
<tr>
<td>Drinking raw milk</td>
<td>Yes</td>
<td>19</td>
<td>21</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>153</td>
<td>190</td>
<td></td>
</tr>
</tbody>
</table>

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How revealed the association between toxoplasmosis and low education level. While (14) reported a significant correlation between toxoplasmosis and drinking raw milk. Regarding the association between raw and undercooked meat and toxoplasmosis (12). Our study suggests high education level was found protective factor to diminish the risk of transmission in high-risk populations. Molecular modalities like PCR as well as ELISA are peter than Latex Agglutination Test.

Authors’ Contributions
The authors equally participated in designing the study and writing the manuscript. All authors read and approved the final version of the manuscript.

Conflict of Interests
The authors declare no conflict of interests.

Ethical Approval
The ethical approval was taken from the state ministry of health. An informed consent was taken from all participants before enrolling them in the study.

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References

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